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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/834,501	04/12/2001	Gerhard Schneider	5196/ETCH/CONE/JB1	5799

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APPLIED MATERIALS, INC.
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EXAMINER

ALEJANDRO MULERO, LUZ I.

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/834,501

Applicant(s)

SCHNEIDER ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-16, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-16 and 20-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 13, 16, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukada et al., U.S. Patent 4,482,419 in view of Yamazaki et al., U.S. Patent 5,302,226 or Hongoh et al., U.S. Patent 6,358,324.

Tsukada et al. shows the invention substantially as claimed including a processing system comprising: a chamber body having a bottom wall; plural article supports 11 disposed inside the chamber body, each of the plural article support comprising an upper surface and a lower surface facing the bottom wall; plural stems, each supporting a respective one of the plural article supports, each of the plural stems

extending from the bottom wall to the lower surface of its respective article support; and a partition extending partially toward the bottom wall from a top wall of the chamber body downward between the plural article supports; wherein each of the plural article supports is sufficiently wide to support one of the plural semiconductor articles on its upper surface, and wherein each of the article supports is substantially wider than its respective stem (see figs. 2, 4, 6); for a complete description of the apparatus see figs. 2, 4, 6 and 9, and their descriptions).

Tsukada et al. further discloses that the gas can be exhausted from the chambers through a common pumping port (see col. 2, lines 56-58), but does not expressly disclose that the pumping port is formed in the bottom wall at least partially beneath the plural article supports. Yamazaki et al. discloses an apparatus in which a stem is use for supporting the substrate support, the pumping port is formed in the bottom wall partially beneath of the plural article support and a vacuum pump is in fluid communication with the pump port, in order to efficiently control the pressure of the chamber (see, for example, fig. 4 and col. 5, lines 46-55). Furthermore, Hongoh et al. discloses an apparatus in which a stem is use for supporting the substrate support and in which the pumping port is located in the bottom wall of the chamber and beneath the article support, in order to evacuate the entire process chamber uniformly and maintained a uniform plasma density in the process chamber (see fig. 2 and col. 7, lines 22-30). Therefore, in view of these disclosures it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tsukada et al. as to locate the pumping port in the bottom wall of the

process chamber, the pumping port having a vacuum pump in fluid communication, in order to efficiently and uniformly evacuate the entire process chamber and maintained a uniform plasma density in the process chamber.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukada et al., U.S. Patent 4,482,419 in view of Yamazaki et al., U.S. Patent 5,302,226 or Hongoh et al., U.S. Patent 6,358,324, as applied to claims 13, 16, and 20-21 above, and further in view of Turner et al., U.S. Patent 5,509,464.

Tsukada et al., Yamazaki et al. and Hongoh et al. are applied as above. With respect to the article support being supplied with a DC potential via the stem, Yamazaki et al. discloses an apparatus in which a DC potential can be supplied via the stem (see col. 7, lines 53-55). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tsukada et al. as to further supply a DC potential to the article support as an alternative voltage means in place of the RF, as suggested by Yamazaki et al..

Regarding the article support being supplied with a coolant via the stem, Yamazaki et al. discloses an apparatus in which coolant can be supplied via the stem in order to control and maintain the temperature of the substrate within a desired temperature. Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tsukada et al. as to further supply a coolant to the article support, as

taught by Yamazaki et al., in order to control and maintain the temperature of the substrate within a desired temperature.

Furthermore, Tsukada et al. Yamazaki et al., and Hongoh et al. do not expressly disclose that the article support is supplied with helium gas via the stem. Turner et al. discloses an apparatus in which helium is supplied to the article support through the stem (see col. 4, lines 44-59). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tsukada et al. modified by Yamazaki et al. or Hongoh et al. as to further supply helium gas to the article support in order to provide means for improving heat conduction from the substrate to the cooled pedestal.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukada et al., U.S. Patent 4,482,419 in view of Yamazaki et al., U.S. Patent 5,302,226 or Hongoh et al., U.S. Patent 6,358,324. as applied to claims 13, 16, and 20-21 above, and further in view of Cheng et al., U.S. Patent 5,304,248.

Tsukada et al., Yamazaki et al. and Hongoh et al. are applied as above but do not expressly disclose that the stem of the apparatus further comprises bellows. Cheng et al. discloses an apparatus comprising a stem for supporting an article support 40 and comprising bellows 48 disposed between the article support and the bottom wall of the processing chamber (see col. 4, lines 29-35 and fig. 2). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tsukada et al. modified by Yamazaki et al. or

Hongoh et al. as to comprise a stem comprising bellows to permit vertical movement of the article support.

Claims 13, 16 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al., U.S. Patent 5,302,226 in view Tsukada et al., U.S. Patent 4,482,419.

Yamazaki et al. shows the invention as claimed including a chamber for processing an article 50-2, the chamber comprising: a chamber body having a bottom wall with a pumping port formed therein (see figs. 4 and 5); an article support 43, 73 disposed inside the chamber body and comprising an upper surface, and a lower surface facing the bottom wall; wherein the article support has a first width to support the article on the upper surface; and a stem extending from the bottom wall of the chamber body to the lower surface of the articles support, the stem supporting the article support (see figs. 4 and 5); wherein the stem has a second width smaller than the first width (see figs. 4 and 5).

The article support is circular (see col. 5, line 50), having a center; the stem connects to the article support at a position offset from the center (see figs. 4 and 5); the pumping port is located completely beneath the article support (see figs. 4 and 5); the stem is adapted to couple RF energy to the article support and that alternatively DC potential may be used/supplied (see col. 7, lines 50-55). Furthermore, note that the apparatus of Yamazaki et al. further comprises internal cooling journals formed in the

article support supplied with coolant via the stem (see col. 6, lines 51-55 and col. 7, lines 58-62).

Yamazaki et al. does not expressly disclose a plurality of stems, each plurality of stems supporting a respective one of a plurality of article supports, and a partition extending from a top wall of the chamber body downward between the plural article supports. Tsukada et al. discloses a processing chamber 10 having at least two processing regions 10b and 10e each processing region comprising a plurality of stems 11, each plurality of stems supporting a respective one of a plurality of article supports, and further comprising a partition extending from a top wall of the chamber body downward between the plural article supports (see figs. 2, 4, 6, and 9, and their descriptions). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Yamazaki et al. as to comprise the claimed plural article supports and partition structure because in such a way a plurality of articles can be processed at the same time and therefore the processing time is reduced and the throughput of the apparatus is increased.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al., U.S. Patent 5,302,226 in view Tsukada et al., U.S. Patent 4,482,419, as applied to claims 13, 16 and 20-21 above, and further in view of Turner et al., U.S. Patent 5,509,464.

Yamazaki et al. and Tsukada et al. are applied as above but do not expressly disclose that the article support is supplied with helium gas via the stem. Turner et al. discloses an apparatus in which helium is supplied to the article support through the stem (see col. 4, lines 44-59). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Yamazaki et al. modified by Tsukada et al. as to further supply helium gas to the article support in order to provide means for improving heat conduction from the substrate to the cooled pedestal.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al., U.S. Patent 5,302,226 in view Tsukada et al., U.S. Patent 4,482,419, as applied to claims 13, 16 and 20-21 above, and further in view of Cheng et al., U.S. Patent 5,304,248.

Yamazaki et al. and Tsukada et al. are applied as above but do not expressly disclose that the stem of the apparatus further comprises bellows. Cheng et al. discloses an apparatus comprising a stem for supporting an article support 40 and comprising bellows 48 disposed between the article support and the bottom wall of the processing chamber (see col. 4, lines 29-35 and fig. 2). In view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Yamazaki et al. modified by Tsukada et al., as to comprise a stem comprising bellows to permit vertical movement of the article support.

Claims 13, 15-16 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng et al., U.S. Patent 5,304,248 in view Tsukada et al., U.S. Patent 4,482,419.

Cheng et al. shows the invention as claimed including a chamber for processing an article 10, the chamber comprising: a chamber body having a bottom wall with a pumping port formed therein (see figs. 2 and 5); an article support 40 disposed inside the chamber body and comprising an upper surface 42, and a lower surface 41 facing the bottom wall; wherein the article support has a first width to support the article on the upper surface; and a stem extending from the bottom wall of the chamber body to the lower surface of the articles support, the stem supporting the article support (see figs. 2 and 5); wherein the stem has a second width smaller than the first width (see figs. 2 and 5).

The article support is circular (see col. 4, lines 21-22), having a center; the stem connects to the article support at a position offset from the center (see figs. 2 and 5); the stem of the apparatus of Cheng et al. comprises bellows 48 disposed between the article support and the bottom wall of the processing chamber (see col. 4, lines 29-35 and fig. 2).

Cheng et al. does not expressly disclose a plurality of stems, each plurality of stems supporting a respective one of a plurality of article supports, and a partition extending from a top wall of the chamber body downward between the plural article supports. Tsukada et al. discloses a processing chamber 10 having at least two processing regions 10b and 10e each processing region comprising a plurality of stems

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11, each plurality of stems supporting a respective one of a plurality of article supports, and further comprising a partition extending from a top wall of the chamber body downward between the plural article supports (see figs. 2, 4, 6, and 9, and their descriptions). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Cheng et al. as to comprise the claimed plural article supports and partition structure because in such a way a plurality of articles can be processed at the same time and therefore the processing time is reduced and the throughput of the apparatus is increased.

Response to Arguments

Applicant's arguments filed 8/13/04 have been fully considered but they are not persuasive.

Applicant argues that the motivation (to maintain a uniform plasma density) to modify the Tsukada et al. reference is improper because it teaches away from the principle of the apparatus of Tsukada et al.. However, the examiner respectfully disagrees because uniform plasma density can be achieved in both chambers without the chambers having the same process conditions. It should be noted that having a uniform plasma density in each chamber does not mean that the plasma density is necessarily the same in both chambers.

Additionally, applicant argues that modification of Yamazaki et al. or Cheng et al. based upon the Tsukada et al. reference is not proper because "it is far from clear that

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this would reduce the overall processing time or increase throughput". The examiner respectfully disagrees because, as well known in the art, when processing a large number of wafers, the processing of two or more wafers simultaneously, as taught in Tsukada et al., as opposed to processing one wafer at a time, will reduce the processing time and will increase the throughput of the apparatus.

Applicant arguments with respect to the Nakai reference (JP 62-26811) were persuasive and therefore, the rejections including the Nakai reference have been withdrawn.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-

1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro
Primary Examiner
Art Unit 1763

October 28, 2004